Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Biodegradable Inkjet-printed Electrochromic Display For Sustainable Short-Lifecycle Electronics

Manuel Pietsch[a,b], Stefan Schlisske[a,b], Martin Held[a,b], Noah Strobel[a,b], Alexander Wieczorek[a,b], Gerardo Hernadez-Sosa*[a,b]

[a] Light Technology Institute, Karlsruhe Institute of Technology, Engesserstr. 13, 76131 Karlsruhe; Germany
[b] InnovationLab, Speyererstr. 4, 69115 Heidelberg; Germany

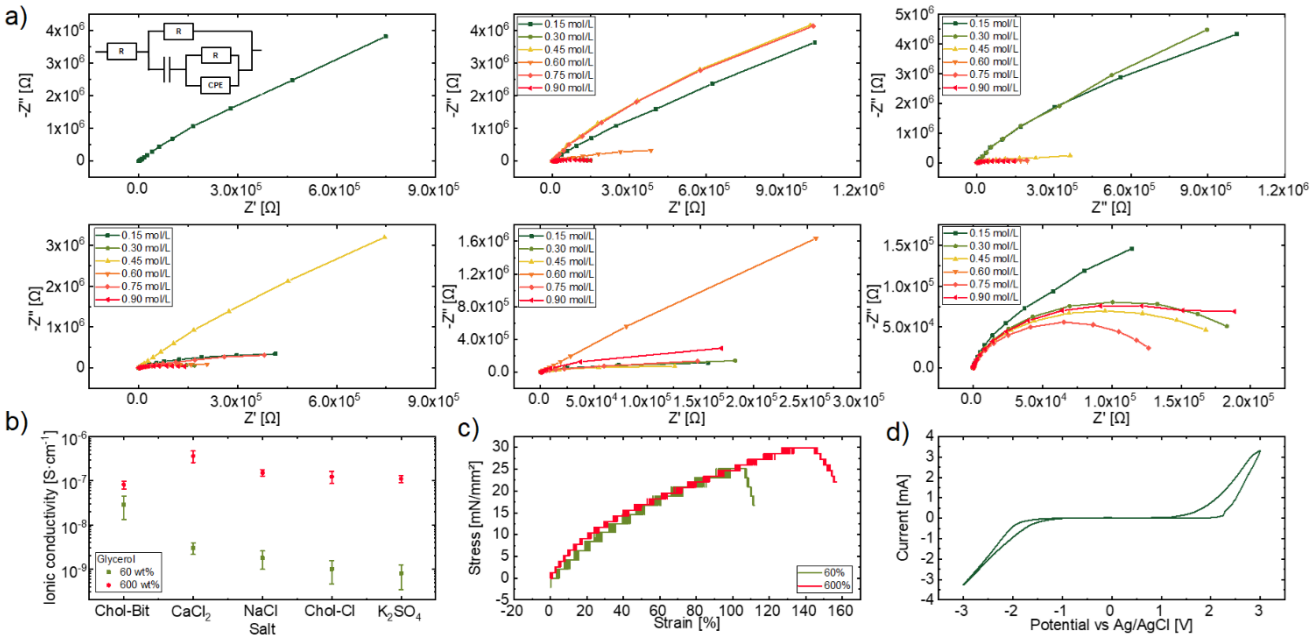

Figure S1. a) Nyquist plots of the impedance measurements of the different gelatin electrolytes at a voltage of 50 mV from 100kHz to 4mHz. b) Ionic conductivity for different salts in the electrolyte with 60wt% and 600wt% glycerol at a concentration of 30mol·L^{-1}. c) Tensile test of the electrolyte with 60wt% and 600wt% glycerol. d) Cyclic voltammetry measurement of the gelatin electrolyte with 600wt% glycerol and 15mol·L^{-1} NaCl.

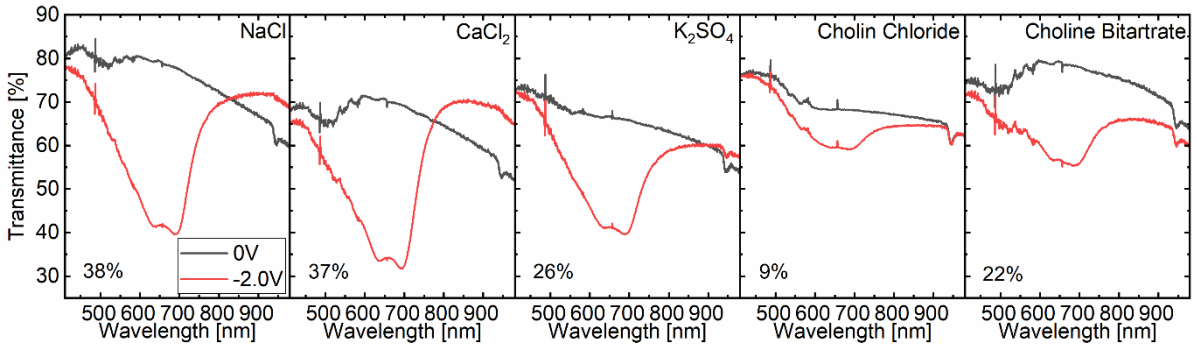

Figure S2. UVvis measurements of the change in transmittance of the electrochromic devices for different salts. The concentration was set to 0.15 mol·L^{-1}. The numbers in the lower left corner represent the electrochromic contrast of the devices.

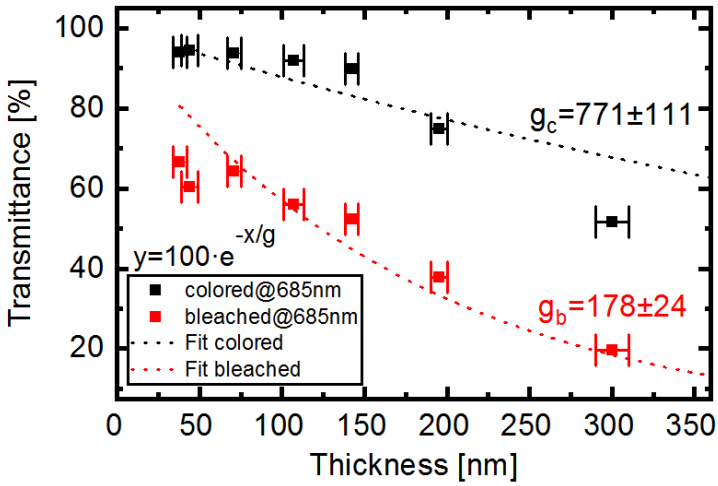

Figure S3. Transmittance of the PEDOT:PSS pixel in its bleached and colored state at different layer thicknesses and the corresponding fitted exponential curves.

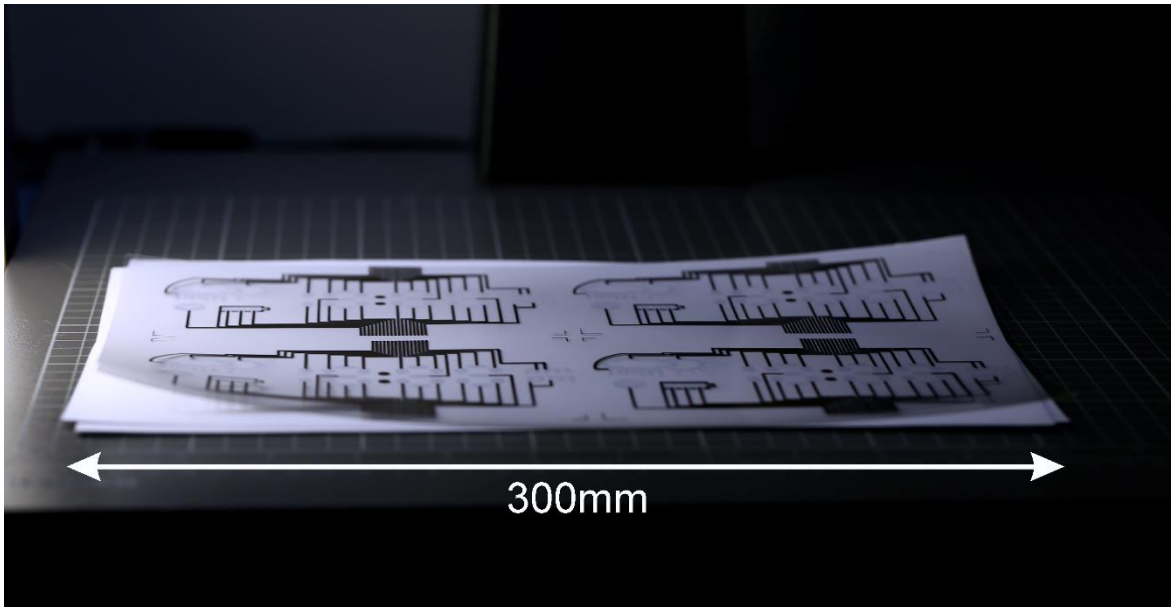

Figure S4. Photograph of four printed displays on a DinA4-sized cellulose diacetate substrate.

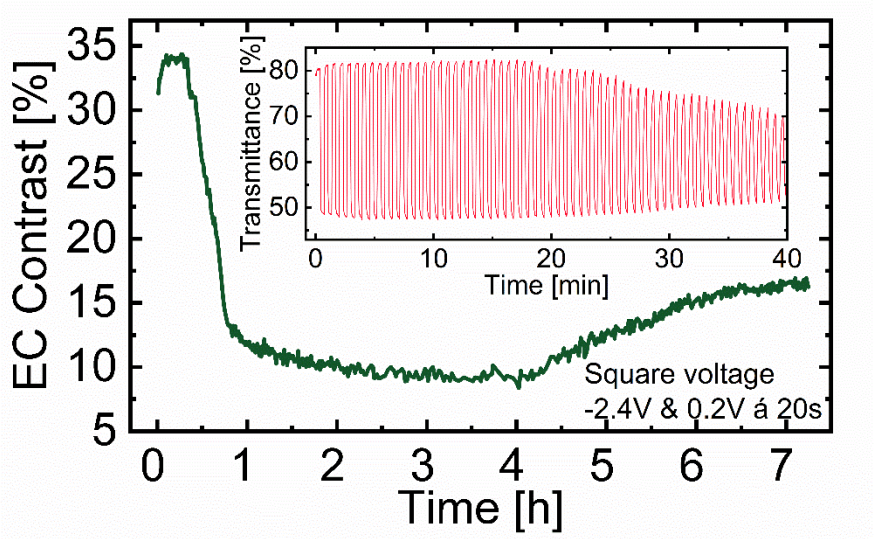

Figure S5. Electrochromic Contrast over time while continuous switching the device with an applied square voltage between -2.4 V and 0.2 V. The inset shows the transmittance in the first 40 minutes.

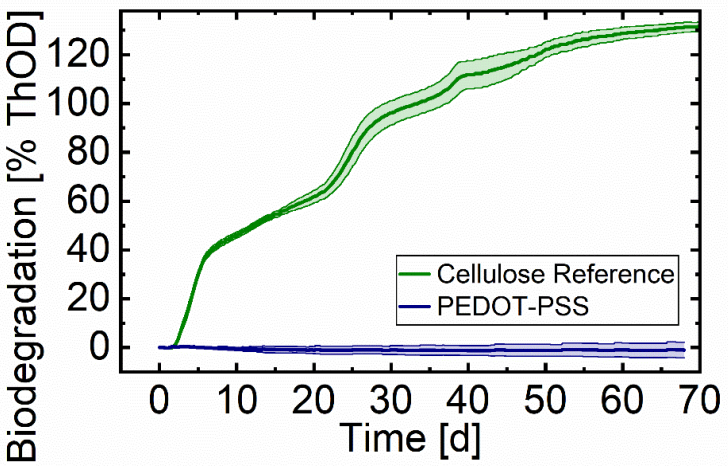

Figure S6. Biodegradation of PEDOT:PSS in an aqueous environment according to the international standard ISO14851. Microcrystalline cellulose was used as a reference. The full report is available upon request.

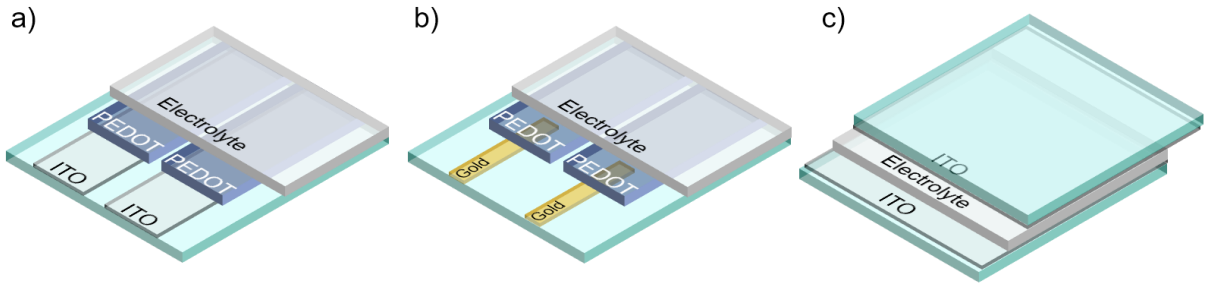

Figure S7. Types of different architectures used in this work. a) Prestructured ITO electrodes underneath the whole electrochromic PEDOT layers and covered with the gelatin electrolyte. b) Gold electrodes connected to the electrochromic PEDOT layers and covered with the gelatin electrolyte. c) Electrolyte sandwiched between ITO covered glass slides.

Movie S1. Wearable device under operation
Movie S2. Adhesion of the wearble device under motion

Data-PDF. Biodegradation Report of the display